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Freezable Radiator Model Correlation and Full Scale Design

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Comment [RAS1]: Is this the same title as last year? If so, please make a slight modification. Tom and I are trying to change the titles a little bit.

ABSTRACT

Freezable radiators offer an attractive solution to the issue of thermal control system scalability. As thermal environments change, a freezable radiator will effectively scale the total heat rejection it is capable of as a function of the thermal environment and flow rate through the radiator. Scalable thermal control systems are a critical technology for spacecraft that will endure missions with widely varying thermal requirements. These changing requirements are a result of the space craft's surroundings and because of different thermal loads during different mission phases.

However, freezing and thawing (recovering) a radiator is a process that has historically proven very difficult to predict through modeling, resulting in highly inaccurate predictions of recovery time. This paper summarizes efforts made to correlate a Thermal Desktop™ model with empirical testing data from two test articles. A 50-50 mixture of DowFrost HD and water is used as the working fluid. Efforts to scale this model to a full scale design, as well as efforts to characterize various thermal control fluids at low temperatures are also discussed.

Comment [RAS2]: To me, "environments" implies thermal environments and cannot include loads also. Fair enough.